
Rule CIC105: Transaction class reached MAXACTIVE too often

Finding: CPExpert has detected that too many tasks in a transaction class were queued because the MAXACTIVE limit had been reached.

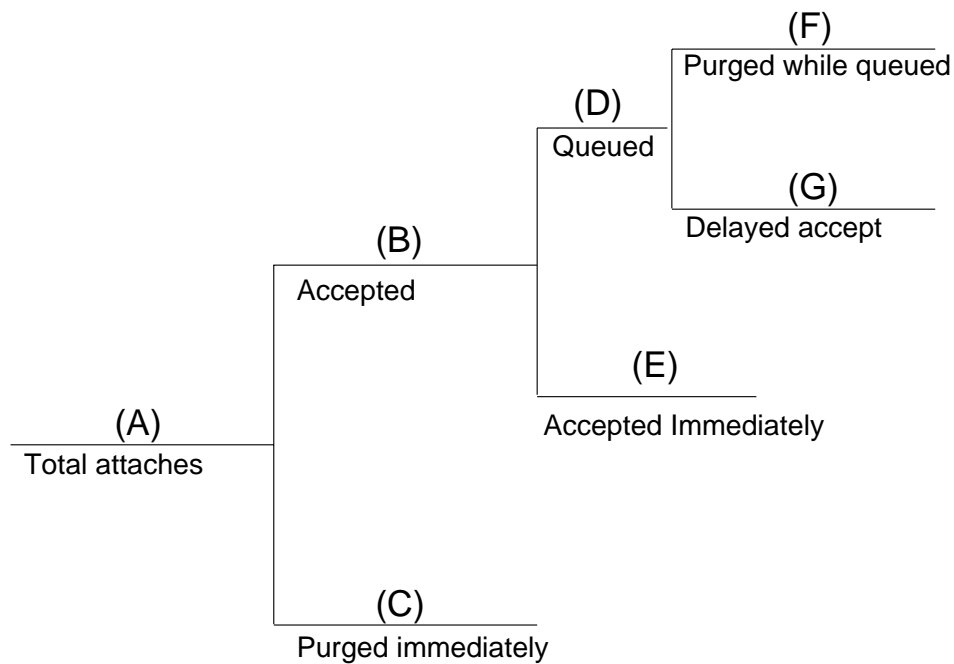
Impact: This finding has a MEDIUM IMPACT or HIGH IMPACT on the performance of the CICS region.

Logic flow: This is a basic finding, based upon an analysis of the daily CICS statistics.

Discussion: The MAXACTIVE attribute for a transaction class can be used to control the number of active tasks in the transaction class. The MAXACTIVE attribute limits the number of transactions for a specific transaction class, while the MXT value (specified in the System Initialization Table) limits the total number of transactions in the CICS region.

The MAXACTIVE value is specified for a transaction class via the CEDA transaction definition with the TRANCLASS keyword. The MAXACTIVE value can be changed using the CEMT SET TRANCLASS command or using the EXEC CICS SET TRANCLASS command.

Please refer to CIC105-1 for a graphical representation of the processing of tasks.



Source: IBM *CICS Performance Guide*, *CICS Version 4.1*

TRANSACTION CLASS PROCESSING

EXHIBIT CIC105-1

- Attach requests are processed by the CICS region for tasks assigned to a transaction class, shown as "(A)" in Exhibit 105-1. This value is contained in the XMCTAT variable of the transaction class statistics.
- Attach requests are either (1) purged immediately or (2) processed further.

The attach requests will be purged immediately if the number of tasks currently accepted or queued equals the PURGETHRESH attribute of the transaction class definition. The number of attach requests that were purged immediately (shown as "(C)" in Exhibit CIC105-1) is contained in the XMCPI variable of the transaction class statistics.

If not purged immediately, the attach requests will be processed further.

- Attach requests which are not purged immediately may be accepted immediately or may be queued.

The attach requests are accepted immediately if the number of currently active tasks is less than the MAXACTIVE attribute of the transaction class definition. The number of attach requests that were accepted immediately (shown as "(E)" in Exhibit CIC105-1) is contained in the XMCAI variable of the transaction class statistics.

An attach request is queued if the number of currently active tasks is equal to or greater than the MAXACTIVE attribute of the transaction class definition. The number of attach requests that were queued (shown as "(D)" in Exhibit CIC105-1) is contained in the XMCAAQ and XMCPWQ variables of the transaction class statistics (the two variables must be summed to yield the total number of attach requests that were queued).

- An attach request that is queued may be purged by operator action while it is queued. The number of attach requests that were purged while queued (shown as "(F)" in Exhibit CIC105-1) is contained in the XMCPWQ variable of the transaction class statistics.
- If the attach request is not purged by operator action, the request is accepted after some queuing delay. The number of attach requests that were accepted after being queued (shown as "(G)" in Exhibit CIC105-1) is contained in the XMCAAQ variable of the transaction class statistics.

As described above, the MAXACTIVE attribute of the transaction class definition is used to control the number of tasks which may be active in the CICS region at any one time. There are several situation in which the MAXACTIVE attribute may be used to limit the number of active tasks in a class.

- The MAXACTIVE attribute can be used to control tasks that may be heavy resource users. This control can limit the amount of resources required to support the heavy resource users (either because management wishes to restrict the amount of resources allowed to CICS or because management wishes to restrict the resources devoted to specific tasks).
- The MAXACTIVE attribute can be used to control low priority tasks. This control can allow processor resources to be used by more important tasks.
- The MAXACTIVE operand can be used to ensure that one type of transaction does not monopolize CICS.
- **The MAXACTIVE operand normally should not be used to serialize tasks. Rather, ENQ should be used for this purpose.**

There are a number of disadvantages to limiting the maximum number of active tasks.

- CICS performance can be unnecessarily degraded if the MAXACTIVE value is used to restrict the number of concurrent active tasks in a particular class, and if the system is capable of handling more tasks.
- MAXACTIVE is not normally suited for conversational transactions, because users can be locked out for a lengthy period if the MAXACTIVE value is reached.
- Tasks assigned to a particular class are selected from the dispatchable chain based upon priority. Active tasks may not be dispatched because they are waiting for some event, such as waiting on I/O completion. If the MAXACTIVE value is too low, it is possible that no tasks are dispatched even though low-priority dispatchable tasks may be on the active chain.
- A temporary lockout can occur if the MAXACTIVE value is set too low in an environment where tasks are dependent upon the completion of events processed by other tasks. For example, one task might attach another task and then wait for the completion of an event processed by the attached task. If the attached task is assigned to a task class and the task class is at its maximum, considerable delay may result.

IBM suggests that transaction classes be established for the following categories of transactions:

- Simple enquiries
- Complex enquiries or short browses
- Long browses
- Short updates
- Long updates

CPEXpert produces Rule CIC105 if the CICS interval statistics reported that the maximum active tasks value for any class was reached more than the corresponding guidance value for the transaction class.

Suggestion: CPEXpert suggests that you review the MAXACTIVE attribute for the transaction class. Under most circumstances, the MAXACTIVE ceiling should be reached infrequently. If the ceiling is frequently reached, you

may wish to increase the ceiling.

Alternatively, reaching the MAXACTIVE ceiling may simply be an indication of a performance problem elsewhere in CICS. If CICS performance is poor, tasks will not quickly flow through the system and the MAXACTIVE ceiling may be reached. Tuning CICS areas may cause tasks to move through the system quicker and the MAXACTIVE ceiling may not restrict the number of tasks dispatched in the class.

Alternatively, you may wish to direct tuning efforts at the specific tasks assigned to the class. Perhaps the resource demands of the tasks can be reduced.

Alternatively, the resources used by the tasks can be a constraint. For example, DASD constraints may impede the flow of tasks assigned to the class. Perhaps a improvement in the DASD configuration, reorganizing file placement on volumes, or other actions would reduce the DASD constraint and allow the tasks to more quickly flow through the system.

If the MAXACTIVE attribute for the transaction class identified by this rule is appropriate for your management objectives and CICS performance cannot be improved, then you may wish to change the guidance value for the transaction class to prevent the spurious firing of this rule.

Reference: *CICS/ESA Version 4.1 Performance Guide*: Section 4.7.4 and Appendix A.1.30.

CICS/TS Release 1.1 Performance Guide: Section 4.7.5 and Appendix 1.1.27.

CICS/TS Release 1.2 Performance Guide: Section 4.7.5 and Appendix 1.1.28.

CICS/TS Release 1.3 Performance Guide: Section 4.11.4 and Appendix 1.1.31.

CICS/TS for z/OS Release 2.1 Performance Guide: Chapter 23 (MAXACTIVE) and Appendix A (Table 129)

CICS/TS for z/OS Release 2.2 Performance Guide: Section 4.10.4 Using transaction classes (MAXACTIVE) to control transactions